



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 700 313 B1

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention  
of the grant of the patent:  
27.11.1996 Bulletin 1996/48

(21) Application number: 94913204.7

(22) Date of filing: 29.03.1994

(51) Int. Cl.<sup>6</sup>: B01D 35/143

(86) International application number:  
PCT/NL94/00067

(87) International publication number:  
WO 94/22551 (13.10.1994 Gazette 1994/23)

(54) **ASSEMBLY OF FILTERING APPARATUS AND REPLACEABLE FILTER; AND FILTERING  
APPARATUS AND FILTER FOR USE THEREIN**

**FILTERAUFBAU MIT AUSTAUSCHBAREM FILTEREINSATZ UND FILTERANLAGE UND DABEI  
VERWENDETES FILTER**

**ENSEMBLE CONSTITUE D'UN APPAREIL DE FILTRAGE ET D'UN FILTRE AMOVIBLE, ET  
APPAREIL DE FILTRAGE ET FILTRE AMOVIBLE ASSOCIES**

(84) Designated Contracting States:  
BE DE DK FR GB IT LU NL SE

(30) Priority: 29.03.1993 NL 9300554

(43) Date of publication of application:  
13.03.1996 Bulletin 1996/11

(73) Proprietor: DOCTRO A.V.V.  
Oranjestad, Aruba (AW)

(72) Inventor: DEN DEKKER, Dirk, Jan, Marinus  
NL-1861 CM Bergen (NL)

(74) Representative: Van Breda, Jacobus  
Octroolbureau Los & Stigter,  
P.O. Box 20052  
1000 HB Amsterdam (NL)

(56) References cited:  
EP-A- 0 202 201 DE-A- 3 126 850  
US-A- 4 654 140

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 700 313 B1

## Description

The invention relates to an assembly of a filtering apparatus and a replaceable filter.

In various types of filtering apparatuses, such as industrial exhausters, vacuum cleaners, filtering devices in lubrication systems etc., the filter should be replaced periodically because clogging will degrade its operation. When it is replaced several things can go wrong, such as incorrect fitting, fitting of a wrong or unapproved type and the like, which jeopardizes the correct operation of the filtering apparatus or even the personal safety.

It is the object of the invention to provide an assembly of filtering apparatus and replaceable filter in which this disadvantage is removed in an effective way.

For this purpose, the assembly according to the invention is characterized by an electronic filter identification system including an electronic label on the filter and read-out means on the filtering apparatus.

Due to these features it is permitted that the read-out means checks the correct fitting of a proper filter type by means of the label thereby avoiding mistakes.

It is for example possible that the read-out means is connected to a control unit of the filtering apparatus and the control unit being influenced by the read-out means, in which preferably the control unit is only actuable upon disposing a filter in the filtering apparatus having a proper label. In this way it is impossible to operate the filtering apparatus together with an improper filter, avoiding undesirable or even dangerous situations.

In a further development of the invention, the filter identification system may be interactive permitting for example to provide the label with a read and write memory adapted to store the number of operating hours of the filter and to switch off the filtering device if the maximum permitted number of operating hours has been reached. This prevents the filter from being used too long which would endanger the proper operation of the filter. Since the label in the filter itself counts the number of operating hours, a correct counting is maintained also when the filter is removed from the filtering apparatus and is fitted again in the same or another filtering apparatus, so that a timely warning for the end of the operating time is ensured.

Preferably, the filtering apparatus comprises an indicating means such as a display or indicator lamps of a control panel, for showing information on the filter.

With this indicating means an operator can be provided with information received by the read-out means of the filter label, for example the fitting of an incorrect filter, or the attainment of the maximum operating time, so that the necessary actions can be taken immediately.

The invention includes both the assembly of filtering apparatus and filter, and the filtering apparatus and the filter having the features as mentioned separately.

The invention will hereafter be elucidated with reference to the drawing showing a substantially simplified diagram of an exemplary embodiment of the invention.

The only figure of the drawing shows a filtering apparatus indicated by reference numeral 1 and accommodating therein an exchangeable filter 2. The filtering apparatus 1 may be part of a great number of different types of apparatus, such as for instance industrial exhausters to be used in welding operations for example, in vacuum cleaners or also in fluid circuits in which a fluid is filtered during each circulation. The fluid includes both air, gas and liquids. The filter 2 will preferably be a mechanical filter in which the fluid is guided through a porous material or a material structure having small passage openings separating solid matter from the fluid. For this purpose, the drawing shows a fluid line 3 extending through the filter 2, and a pressure or vacuum source 4, for example a pump, for forcing the fluid through the filter 2.

The replaceable filter 2 has an electronic label 5 to be read out by a read-out means 6 which is mounted in the filtering apparatus 1 and in this case being connected to a central control unit 7 controlling the operation of the filtering apparatus 1 or the machine accommodating the filtering apparatus 1 and to which the pressure or vacuum source 4 is connected. The figure also shows a control panel 8 connected to the control unit 7.

The electronic label 5 comprises information on the filter 2 which is readable by the read-out means 6. Label 5 and read-out means 6 together form an electronic identification system which may be provided in several embodiments. In a simple embodiment one may use for example resonance circuits, magnetic strip cards or optical cards, in which systems the label can only act as transmitter and the read-out means as receiver. In more sophisticated systems there may be an interaction of label and read-out means so that both label and read-out means are transmitter and receiver at the same time. In these identification systems use can be made of a chip card having a small piece of an EEPROM (a read and write memory remaining in tact without electric supply), a "PIT" (programmable identification tag) in which a chip card is used, but in which both the energy and the information is transmitted a distance without contact, or a so-called smart card in which the memory of a chip card is extended to a complete micro controller able to carry out full computations.

All systems are able to transmit information from the label to the read-out means in the filtering apparatus. As a result it is possible to use the read-out means to check the fitting of the correct type of filter in the filtering apparatus. The program of the filtering device may be such that, if not the right filter is fitted, the control unit 7 is inhibited and the filter apparatus or the machine incorporating said filtering apparatus being prevented from being switched on. Consequently, the personal safety and the correct operation of the apparatus is secured. It might be possible to have the control panel 8 indicated that another filter should be fitted.

When an interactive system is used, the features of the filter identification system may be extended sub-

stantially. For example, the actual operating time of the filter may be stored in the label 5 of the filter 2 which will be prevent the filter from being used too long. The user may be warned by an indication on the control panel 8 or the apparatus may be switched off if the maximum permitted operating time is exceeded. During the use of the filter, the operator may be kept informed of the number of operating hours of the filter 2 through the operating panel 8. Of course, other exchanges of information within the interactive system are conceivable.

Particularly, with filters which are used for filtering danger substances, for example asbestos, it may be useful to provide the label 5 of the filter 2 with a copy protection so that only approved filters adapted to the requirements may be used and other filters will be refused by the filtering apparatus 1.

A further extension of the embodiment includes an interactive identification system to store data from the filtering apparatus in the label, data may for example relate to substances which are retained within the filter during filtration. These data may be read out with a portable unit in a waste treatment works in order to determine the best way to dispose the filter as waste.

#### Claims

1. Assembly of a filtering apparatus (1) and a replaceable filter (2), characterized by an electronic filter identification system including an electronic label (5) on the filter and read-out means (6) on the filtering apparatus.
2. Assembly of claim 1, wherein the read-out means (6) is connected to a control unit (7) of the filtering apparatus (1) and the control unit (7) being influenced by the read-out means (6).
3. Assembly of claim 2, wherein the control unit (7) is only actuable upon disposing a filter (2) in the filtering apparatus (1) having a proper label (5).
4. Assembly of one of the preceding claims, wherein the filter identification system (5, 6) is interactive.
5. Assembly of claim 4, wherein the label (5) comprises a read and write memory adapted to store the number of operating hours of the filter (2).
6. Assembly of one of the preceding claims, wherein the filtering apparatus comprises an indicating means (8) such as a display or indicator lamps of a control panel, for showing information on the filter (2).
7. Assembly of one of the preceding claims, wherein the label (5) comprises a copy protection.
8. Filtering apparatus (1) adapted to receive a replaceable filter (2), characterized in that said

apparatus comprises read-out means (6) adapted to cooperate with an electronic label (5) on the filter (2) to form an electronic filter identification system.

9. Filter (2) adapted to be placed in a filtering apparatus (1), characterized in that said filter (2) comprises an electronic label (5) adapted to cooperate with read-out means (6) on the filtering apparatus (1) to form an electronic filter identification system.

#### Patentansprüche

1. Baueinheit eines Filtriergeräts (1) und austauschbarer Filter (2), gekennzeichnet durch ein elektronisches Filtererkennungssystem, das ein elektronisches Etikett (5) auf dem Filter und eine Ableseeinrichtung (6) auf dem Filtriergerät aufweist.
2. Baueinheit nach Anspruch 1, wobei die Ableseeinrichtung (6) mit einer Kontrolleinheit (7) des Filtriergeräts (1) verbunden ist und die Kontrolleinheit (7) durch die Ableseeinrichtung (6) beeinflusst wird.
3. Baueinheit nach Anspruch 2, wobei die Kontrolleinheit (7) nur beim Einlegen eines Filters (2) in das Filtriergerät (1) mit einem geeigneten Etikett (5) betätigbar ist.
4. Baueinheit nach einem der vorhergehenden Ansprüche, wobei das Filtererkennungssystem (5, 6) interaktiv ist.
5. Baueinheit nach Anspruch 4, wobei das Etikett (5) einen Lese- und Schreibspeicher umfaßt, der geeignet ist, die Zahl der Betriebsstunden des Filters (2) zu speichern.
6. Baueinheit nach einem der vorhergehenden Ansprüche, wobei das Filtriergerät eine Anzeigeeinrichtung (8), wie zum Beispiel ein Display oder Anzeigeleuchten einer Überwachungsstafel umfaßt, um Informationen über das Filter (2) anzuzeigen.
7. Baueinheit nach einem der vorhergehenden Ansprüche, wobei das Etikett (5) einen Kopierschutz umfaßt.
8. Filtriergerät (1), das für die Aufnahme eines austauschbaren Filters (2) geeignet ist, dadurch gekennzeichnet, daß das Gerät eine Ableseeinrichtung (6) umfaßt, die geeignet ist, mit einem elektronischen Etikett (5) über das Filter (2) zusammenzuwirken, um ein elektronisches Filteridentifikationssystem zu bilden.
9. Filter (2), das geeignet ist, um in einem Filtriergerät (1) angeordnet zu werden, dadurch gekennzeichnet, daß das Filter (2) ein elektronisches Etikett (5)

umfaßt, das geeignet ist, mit der Ableseeinrichtung (6) über das Filtriergerät (1) zusammenzuwirken, um ein elektronisches Filteridentifikationssystem zu bilden.

5

## Revendications

1. Assemblage d'un appareil de filtrage (1) et d'un filtre amovible (2), caractérisé en ce qu'il comporte un système d'identification de filtre électronique comportant une étiquette électronique (5) sur le filtre et des moyens de lecture (6) sur l'appareil de filtrage. 10
2. Assemblage selon la revendication 1, dans lequel les moyens de lecture (6) sont connectés à une unité de commande (7) de l'appareil de filtrage (1), l'unité de commande (7) étant influencée par les moyens de lecture (6). 15
3. Assemblage selon la revendication 2, dans lequel l'unité de commande (7) est uniquement actionnable lors du dépôt d'un filtre (2) dans l'appareil de filtrage (1) ayant une étiquette convenable (5). 20
4. Assemblage selon l'une quelconque des revendications précédentes, dans lequel le système d'identification de filtre (5,6) est interactif. 25
5. Assemblage selon la revendication 4, dans lequel l'étiquette (5) comporte une mémoire de lecture et écriture adaptée pour le stockage du nombre d'heures de fonctionnement du filtre (2). 30
6. Assemblage selon l'une quelconque des revendications précédentes, dans lequel l'appareil de filtrage comporte des moyens d'indication (8) tel qu'un afficheur ou des lampes indicatrices d'un panneau de commande, pour la représentation d'informations sur le filtre (2). 35
7. Assemblage selon l'une quelconque des revendications précédentes, dans lequel l'étiquette (5) comporte une protection contre des copies. 40
8. Appareil de filtrage (1) adapté pour recevoir un filtre amovible (2), caractérisé en ce que ledit appareil comporte des moyens de lecture (6) adaptés pour coopérer avec une étiquette électronique (5) sur le 45  
pour former un système d'identification de filtre électronique. 50
9. Filtre (2) adapté pour être placé dans un appareil de filtrage (1), caractérisé en ce que ledit filtre (2) comporte une étiquette électronique (5) adaptée 55  
pour coopérer avec des moyens de lecture (6) sur l'appareil de filtrage (1) pour former un système d'identification de filtre électronique.

